

What is claimed is:

1. A wireless communication system comprising:
 - a mobile terminal;
 - 5 a base station apparatus;
 - a data relay apparatus; and
 - a server apparatus,wherein one of said mobile terminal, said base station apparatus, said data relay apparatus and said
10 server apparatus includes:
 - a transmitting unit which transmits a transmission data and receives an acknowledgement data corresponding to said transmission data through a communication line,
 - a monitoring unit which monitors said transmission
15 data and said acknowledgement data,
 - a determining unit which determines a retransmission timeout period based on a monitored result by said monitoring unit in a certain period, and
 - said transmitting unit retransmits said
20 transmission data when said acknowledgement data is not received in said retransmission timeout period.
2. The wireless communication system according to claim 1, wherein said communication line includes a
25 wireless communication line and a wire communication line.

3. The wireless communication system according to claim 2, wherein said determining unit determines said retransmission timeout period based on said monitored result in a most recent certain period.

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4. The wireless communication system according to claim 1, wherein said monitoring unit monitors a round trip time and a data size(Dmin, Dmax, Dsize) of said transmission data, and

10 said round trip time is a time difference between a transmission time of said transmission data and a reception time of said acknowledgement data.

5. The wireless communication system according to
15 claim 4, wherein said determining unit determines said retransmission timeout period by a calculation based on the minimum of said round trip time, a data size of the minimum of said round trip time, the maximum of said round trip time and a data size of the maximum of said round trip
20 time.

6. The wireless communication system according to claim 5, wherein said determining unit estimates an expectation communication rate of said communication line
25 based on said data size of the minimum of said round trip time and the minimum of said round trip time, and calculates

said retransmission timeout period based on said expectation communication rate and a data size of said transmission data, the maximum of said round trip time and said data size of the maximum of said round trip time.

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7. The wireless communication system according to claim 6, further including:

a memory unit which stores a monitoring history of said round trip time and said data size,

10 wherein said determining unit uses said data size of the minimum of said round trip time and the minimum of said round trip time stored in said memory unit for estimating said expectation communication rate.

15 8. The wireless communication system according to claim 7, wherein said determining unit estimates a maximum variation delay time of said communication line based on said data size of the maximum of said round trip time, the maximum of said round trip time and said expectation
20 communication rate, and calculates said retransmission timeout period based on said expectation communication rate, said maximum variation delay time and said data size of said transmission data.

25 9. The wireless communication system according to claim 4, further including:

a storage unit which associates a usage situation of said communication line with an expectation communication rate of said communication line and a maximum variation delay time of said communication line, and stores
5 them,

wherein said determining unit obtains said usage situation of said communication line, and calculates said retransmission timeout period based on said data size of said transmission data, said usage situation, said
10 expectation communication rate and said maximum variation delay time, and

said expectation communication rate and said maximum variation delay time are obtained from said storage unit based on said usage situation.

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10. The wireless communication system according to claim 9, wherein said usage situation is one of a traffic condition of said communication line, a channel quality of said communication line and a time zone of a time of
20 transmitting said transmission data.

11. An information processing apparatus used for a wireless communication, comprising:

a transmitting unit which transmits a transmission
25 data and receives an acknowledgement data corresponding to said transmission data through a communication line;

a monitoring unit which monitors said transmission data and said acknowledgement data; and

a determining unit which determines a retransmission timeout period based on a monitored result
5 by said monitoring unit in a certain period;

wherein said transmitting unit retransmits said transmission data when said acknowledgement data is not received in said retransmission timeout period.

10 12. The information processing apparatus according to claim 11, wherein said communication line includes a wireless communication line and a wire communication line.

13. The information processing apparatus according to
15 claim 12, wherein said determining unit determines said retransmission timeout period based on said monitored result in a most recent certain period.

14. The information processing apparatus according to
20 claim 11, wherein said monitoring unit monitors a round trip time and a data size(Dmin, Dmax, Dsize) of said transmission data, and

said round trip time is a time difference between a transmission time of said transmission data and a
25 reception time of said acknowledgement data.

15. The information processing apparatus according to claim 14, wherein said determining unit determines said retransmission timeout period by a calculation based on the minimum of said round trip time, a data size of the minimum of said round trip time, the maximum of said round trip time and a data size of the maximum of said round trip time.

16. The information processing apparatus according to claim 15, wherein said determining unit estimates an expectation communication rate of said communication line based on said data size of the minimum of said round trip time and the minimum of said round trip time, and calculates said retransmission timeout period based on said expectation communication rate and a data size of said transmission data, the maximum of said round trip time and said data size of the maximum of said round trip time.

17. The information processing apparatus according to claim 16, further comprising:

a memory unit which stores a monitoring history of said round trip time and said data size,

wherein said determining unit uses said data size of the minimum of said round trip time and the minimum of said round trip time stored in said memory unit for estimating said expectation communication rate.

18. The information processing apparatus according to claim 17, wherein said determining unit estimates a maximum variation delay time of said communication line based on
5 said data size of the maximum of said round trip time, the maximum of said round trip time and said expectation communication rate, and calculates said retransmission timeout period based on said expectation communication rate, said maximum variation delay time and said data size
10 of said transmission data.

19. The information processing apparatus according to claim 14, further comprising:

a storage unit which associates a usage situation
15 of said communication line with an expectation communication rate of said communication line and a maximum variation delay time of said communication line, and stores them,

wherein said determining unit obtains said usage
20 situation of said communication line, and calculates said retransmission timeout period based on said data size of said transmission data, said usage situation, said expectation communication rate and said maximum variation delay time, and

25 said expectation communication rate and said maximum variation delay time are obtained from said storage

unit based on said usage situation.

20. The information processing apparatus according to claim 19, wherein said usage situation is one of a traffic condition of said communication line, a channel quality of said communication line and a time zone of a time of transmitting said transmission data.

21. A mobile terminal used for a wireless communication, comprising:

a transmitting unit which transmits a transmission data and receives an acknowledgement data corresponding to said transmission data through a communication line;

a monitoring unit which monitors said transmission data and said acknowledgement data; and

a determining unit which determines a retransmission timeout period based on a monitored result by said monitoring unit in a certain period;

wherein said transmitting unit retransmits said transmission data when said acknowledgement data is not received in said retransmission timeout period.

22. The mobile terminal according to claim 21, wherein said communication line includes a wireless communication line and a wire communication line.

23. The mobile terminal according to claim 22, wherein said determining unit determines said retransmission timeout period based on said monitored result in a most recent certain period.

24. The mobile terminal according to claim 21, wherein said monitoring unit monitors a round trip time and a data size(Dmin, Dmax, Dsize) of said transmission data, and said round trip time is a time difference between a transmission time of said transmission data and a reception time of said acknowledgement data.

25. The mobile terminal according to claim 24, wherein said determining unit determines said retransmission timeout period by a calculation based on the minimum of said round trip time, a data size of the minimum of said round trip time, the maximum of said round trip time and a data size of the maximum of said round trip time.

26. The mobile terminal according to claim 25, wherein said determining unit estimates an expectation communication rate of said communication line based on said data size of the minimum of said round trip time and the minimum of said round trip time, and calculates said retransmission timeout period based on said expectation

communication rate and a data size of said transmission data, the maximum of said round trip time and said data size of the maximum of said round trip time.

5 27. The mobile terminal according to claim 26, further comprising:

a memory unit which stores a monitoring history of said round trip time and said data size,

10 wherein said determining unit uses said data size of the minimum of said round trip time and the minimum of said round trip time stored in said memory unit for estimating said expectation communication rate.

28. The mobile terminal according to claim 27, wherein
15 said determining unit estimates a maximum variation delay time of said communication line based on said data size of the maximum of said round trip time, the maximum of said round trip time and said expectation communication rate, and calculates said retransmission timeout period based
20 on said expectation communication rate, said maximum variation delay time and said data size of said transmission data.

29. The mobile terminal according to claim 24, further
25 comprising:

a storage unit which associates a usage situation

of said communication line with an expectation communication rate of said communication line and a maximum variation delay time of said communication line, and stores them,

5 wherein said determining unit obtains said usage situation of said communication line, and calculates said retransmission timeout period based on said data size of said transmission data, said usage situation, said expectation communication rate and said maximum variation
10 delay time, and

 said expectation communication rate and said maximum variation delay time are obtained from said storage unit based on said usage situation.

15 30. The mobile terminal according to claim 29, wherein said usage situation is one of a traffic condition of said communication line, a channel quality of said communication line and a time zone of a time of transmitting said transmission data.

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31. A determination method of a retransmission timeout period, comprising:

 transmitting a transmission data and receiving an acknowledgement data which corresponds to said
25 transmission data through a communication line;

 monitoring said transmission data and said

acknowledgement data; and

determining a retransmission timeout period based
on a monitored result in a certain period;

wherein said transmission data is retransmitted
5 when said acknowledgement data is not received in said
retransmission timeout period.

32. The determination method according to claim 31,
wherein said communication line includes a wireless
10 communication line and a wire communication line.

33. The determination method according to claim 32,
wherein said determining step includes:

determining said retransmission timeout period
15 based on said monitored result in a most recent certain
period.

34. The determination method according to claim 31,
wherein said monitoring step includes:

20 monitoring a round trip time and a data size(Dmin,
Dmax, Dsize) of said transmission data, and

said round trip time is a time difference between
a transmission time of said transmission data and a
reception time of said acknowledgement data.

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35. The determination method according to claim 34,

wherein said determining step includes:

determining said retransmission timeout period by
a calculation based on the minimum of said round trip time,
a data size of the minimum of said round trip time, the
5 maximum of said round trip time and a data size of the
maximum of said round trip time.

36. The determination method according to claim 35,
wherein said determining step includes:

10 estimating an expectation communication rate of
said communication line based on said data size of the
minimum of said round trip time and the minimum of said
round trip time, and

calculating said retransmission timeout period
15 based on said expectation communication rate and a data
size of said transmission data, the maximum of said round
trip time and said data size of the maximum of said round
trip time.

20 37. The determination method according to claim 36,
further comprising:

storing a monitoring history of said round trip time
and said data size,

wherein in said estimating step, said data size of
25 the minimum of said round trip time and the minimum of said
round trip time stored in said memory unit are used for

estimating said expectation communication rate.

38. The determination method according to claim 37, wherein said calculating step includes:

5 estimating a maximum variation delay time of said communication line based on said data size of the maximum of said round trip time, the maximum of said round trip time and said expectation communication rate, and
 calculating said retransmission timeout period
10 based on said expectation communication rate, said maximum variation delay time and said data size of said transmission data.

39. The determination method according to claim 34,
15 further comprising:

 associating a usage situation of said communication line with an expectation communication rate of said communication line and a maximum variation delay time of said communication line,
20 storing said usage situation, said expectation communication rate and said maximum variation delay time,
 obtaining said usage situation of said communication line, and
 calculating said retransmission timeout period
25 based on said data size of said transmission data, said usage situation, said expectation communication rate and

said maximum variation delay time,

wherein said expectation communication rate and said maximum variation delay time are obtained from said storage unit based on said usage situation.

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40. The determination method according to claim 39, wherein said usage situation is one of a traffic condition of said communication line, a channel quality of said communication line and a time zone of a time of transmitting
10 said transmission data.

41. A computer program product embodied on a computer-readable medium and comprising code that, when executed, causes a computer to perform the following:

15 transmitting a transmission data and receiving an acknowledgement data which corresponds to said transmission data through a communication line;

monitoring said transmission data and said acknowledgement data; and

20 determining a retransmission timeout period based on a monitored result in a certain period;

wherein said transmission data is retransmitted when said acknowledgement data is not received in said retransmission timeout period.

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42. The computer program product according to claim 41,

wherein said communication line includes a wireless communication line and a wire communication line.

43. The computer program product according to claim 42,
5 wherein said determining step includes:

determining said retransmission timeout period based on said monitored result in a most recent certain period.

10 44. The computer program product according to claim 41, wherein said monitoring step includes:

monitoring a round trip time and a data size(Dmin, Dmax, Dsize) of said transmission data, and

15 said round trip time is a time difference between a transmission time of said transmission data and a reception time of said acknowledgement data.

45. The computer program product according to claim 44, wherein said determining step includes:

20 determining said retransmission timeout period by a calculation based on the minimum of said round trip time, a data size of the minimum of said round trip time, the maximum of said round trip time and a data size of the maximum of said round trip time.

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46. The computer program product according to claim 45,

wherein said determining step includes:

estimating an expectation communication rate of
said communication line based on said data size of the
minimum of said round trip time and the minimum of said
5 round trip time, and

calculating said retransmission timeout period
based on said expectation communication rate and a data
size of said transmission data, the maximum of said round
trip time and said data size of the maximum of said round
10 trip time.

47. The computer program product according to claim 46,
further comprising:

storing a monitoring history of said round trip time
15 and said data size,

wherein in said estimating step, said data size of
the minimum of said round trip time and the minimum of said
round trip time stored in said memory unit are used for
estimating said expectation communication rate.

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48. The computer program product according to claim 47,
wherein said calculating step includes:

estimating a maximum variation delay time of said
communication line based on said data size of the maximum
25 of said round trip time, the maximum of said round trip
time and said expectation communication rate, and

calculating said retransmission timeout period based on said expectation communication rate, said maximum variation delay time and said data size of said transmission data.

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49. The computer program product according to claim 44, further comprising:

associating a usage situation of said communication line with an expectation communication rate of said communication line and a maximum variation delay time of said communication line,

storing said usage situation, said expectation communication rate and said maximum variation delay time, obtaining said usage situation of said communication line, and

calculating said retransmission timeout period based on said data size of said transmission data, said usage situation, said expectation communication rate and said maximum variation delay time,

wherein said expectation communication rate and said maximum variation delay time are obtained from said storage unit based on said usage situation.

50. The computer program product according to claim 49, wherein said usage situation is one of a traffic condition of said communication line, a channel quality of said

communication line and a time zone of a time of transmitting
said transmission data.